There is at least one specific measure the Commission could use as an indicator of the risk of being "stranded." The Commission can identify comparable companies used for the purposes of setting the return on equity over the life of the asset which was "stranded" (most rate proceedings include such a list). It could calculate the write-down of assets taken by these companies in the period just prior to and during the life of the "stranded" asset. This potential write down of assets was part of the expectation of comparable risk. To the extent that the incumbent telephone company has failed to take write-downs of a similar order of magnitude (relative to its assets, e.g. as a percentage of assets) it is seeking to be overcompensated for the stranding of investment. That is, it was allowed a comparable rate of return, but did not take a comparable write-down of assets. It now seeks a return of and on those assets which comparable companies have written down and taken off their books.

The following steps are necessary to ensure that ratepayers are fairly treated when regulators are asked to charge them for stranded investment.

(1) Any recovery of stranded investment requires a showing that there is

   (a) a company specific revenue deficiency in the aggregate,

   (b) a revenue deficiency in the specific exchanges which are said to be creating the social obligation, and

   (c) the revenue deficiency threatens the financial integrity of the company.

(2) The Commission shall establish regulations which rigorously define uncompensated capital costs associated with "stranded" "obligation to serve investments" including steps to

   (a) identify precise assets which are alleged to be "stranded;"

   (b) determine whether the assets were deployed to meet an obligation to serve, not a marketing opportunity;

(c) ensure that the assets were the least cost method for discharging the obligation to serve and exclude any imprudence in the investment dec sion; and

(d) determine the xtent to which the risk of the investment being "stranded" has already been compensated by the risk premium allowed to the itility;

(3) Having rigorously identified the value of the "stranded" investment, the Commission should pr vide for the recovery of those investments in a competitive neutral manner that spreads the burden of the social obligations to all the beneficiaries of that obligation. It should

(a) order the comp ny to write off the value of "stranded" investment;

(b) determine tax benefits of write off and flow these back through to ratepayers;

(c) seek to recover the maximum amount possible in the disposal of those assets (e g. offer for sale to the highest bidder or salvage what it can in other ways);

(d) provide for the recovery of remaining costs from a industry-wide recovery fund probably the universal service fund).

(4) LECs shall be precluded from competing in areas in which they have sought "stranded" investment recovery for significant assets for a five year period.

VIII.

COST ALLOCATION ON THE INFORMATION SUPERHIGHWAY

The concepts discussed in the previous chapters can be well demonstrated with a review of the debate over broadband, video dialtone (VDT) networks which has been placed before the FCC. Hotly debated cost numbers have been put on the table. The issue of cost allocation has been raised repeatedly.

Local exchange companies want to minimize the size of investment attributed to the broadband network and treat video investments as incremental, declaring the broadband network just the next step in telephony. By doing so, they seek to attribute few if any shared costs to the video side. On the other side are potential competitors and consumers. They argue that this allocation creates at least a strategic price advantage, if not a technical cross-subsidy, for the local exchange company's competitive services. It also improperly burdens ratepayers.

In this section, the debate around cost estimates in the U.S. is described. For the purposes of this analysis, two examples, one offered by a telephone company witness[44], and one offered by a cable company witness[45], are considered to underscore the need for careful analysis of cost structures and cost allocations along the lines of those proposed in the previous

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[44] Robert G. Harris, Video Dialtone Cost Allocation: The Position of Pacific Bell, October 28, 1994, hereafter "Harris". Although this particular example has not, to my knowledge, been filed with the Federal Communications Commission, the first footnote in the paper notes that Harris has testified in support of the Pacific Bell application for a video dialtone license.

[45] Leland L. Johnson, Designing Safeguards Against Cross-Subsidization in Video Dialtone Service, CC Docket No. 87-266, October 3, 1994, submitted on behalf of Adelphia Communications Corporation, Cablevision Industries, Comcast Corporation, and Cox Enterprises, Inc., hereafter "Johnson".

section.

A. ISOLATING INCREMENTAL AND COMMON COSTS

Table 1 shows the results of the primary examples used by these witnesses. Both of these are hypotheticals. Neither witness claims that the actual numbers are reflective of actual costs, although it is clear that they believe that they are.

TABLE 1
HYPOTHETICAL COST STRUCTURES OF VIDEO/TELEPHONE NETWORKS

	HARRIS	JOHNSON
INTEGRATED SYSTEM	$1000	$1650
VIDEO ONLY	700	1400
TELEPHONE ONLY	900	800
INCREMENTAL COST OF VIDEO	100	850
INCREMENTAL COST OF TELEPHONE	300	250
COMMON COSTS	600	550

Robert G. Harris, Video Dialtone Cost Allocation: The Position of Pacific Bell, October 28, 1994, hereafter "Harris". Although this particular example has not, to my knowledge, been filed with the Federal Communications Commission, the first footnote in the paper notes that Harris has testified in support of the Pacific Bell application for a video dialtone license.

Leland L. Johnson, Designing Safeguards Against Cross-Subsidization in Video Dialtone Service, CC Docket No. 87-266, October 3, 1994, submitted on behalf of Adelphia Communications Corporation, Cablevision Industries, Comcast Corporation, and Cox Enterprises, Inc.

The analysis involves calculating stand-alone costs for video, telephony and an integrated network. By subtracting the stand-alone costs (SAC) of each system from the costs of the integrated system, we derive an estimate of the incremental costs (IC) of adding the other service.

SAC(integrated) - SAC(service I) = IC(Service II)

For each of the services the incremental cost will be calculated as follows:

SAC(Integrated) - SAC(video) = IC(telephone)

Harris: $1000 - 700 = 300

Johnson: $1650 - 1400 = 250

SAC(Integrated) - SAC(telephone) = IC(video)

Harris: $1000 - 900 = 100

Johnson: $1650 - 800 = 850

Common costs (CC) are the obverse of Incremental costs:

SAC(Service I) - IC(Service I) = CC(Service I)

For each of the services, the common costs will be calculated as follows:

SAC(telephone) - IC(telephone) = CC(telephone)

Harris: $900 - 300 = 600

Johnson: $800 - 250 = 550

SAC(video) - IC(video) = CC(video)

Harris: $700 - 100 = 600

Johnson: $1650 - 850 = 550

Before we begin the cost allocation exercise, it is interesting to note the cost structure in the two examples. First, note that Harris, the telephone company witness, uses an example in which the cost of an interactive video system is less than the cost of an interactive telephone system. This is, at the very least, counter-intuitive. Johnson, on the other hand, shows a cost for an interactive video system that is almost twice that of a telephone system. The empirical

evidence suggests that interactive video costs should be higher, but perhaps not that much higher.

Second, although common costs are of similar magnitude in both analyses, they appear to be a much larger percentage of total costs in the Harris example and the Johnson telephone case. In the Harris example, they are 67 percent of telephone costs and 86 percent of video costs. In the Johnson telephone case, they are about 69 percent of telephone costs, but only 38 percent of video costs. This difference stems from fundamentally different assumptions about the cost of building a stand-alone video system.

B. SUBSIDY FREE PRICES

Using these numbers, we can calculate the range of subsidy- free prices for each of the services on the integrated network. Telephone subscribers must be charged at least their incremental costs. Their rates would be at least $300 in the Harris example. If that is all they are charged, then video subscribers must be charged $700, in order for all costs to be covered. Conversely, video subscribers must be charged at least $100. If that is all they are charged, then telephone subscribers must be charged $900, in order to cover all costs.

Thus, telephone subscribers can cover between $300 and $900 of the total costs, while video subscribers can be charged between $100 and $700, without incurring any subsidy.

In the Johnson example, telephone subscribers must be charged between $250 and $800, while video subscribers must be charged between $850 and $1450. Johnson sums the situation up as follows:

> As long as video subscribers pay no less than the video incremental cost of $850, telephone subscribers would pay not more than $800 -- no more than they would

be obliged to pay in the absence of video. Thus, cross-subsidization of video would not arise. If video were assigned no common costs, telephone users would enjoy none of the benefits of the integrated network (though they should be no worse off than with a separate telephone network). Conversely, if video were assigned all the common costs, video users would be no better off, nor worse off, than if they were confined to a separate video network. Any particular assignment, then, determines how the benefits of joint network use are shared between telephone and video users.[46]

C. PROBLEMS POSED BY THE EXISTING NETWORK

The above examples consider only new networks being built. The difficulty of identifying costs is compounded by the existence of the current network.

Harris adds a wrinkle to this analysis when he assumes that the stand-alone cost of the new telephone network is lower than the current costs of delivering telephone service. In his example, current telephone costs are $1200, compared to only $1000 of the new stand-alone network.[47]

Harris then argues that the cost comparison should be between the existing network and the new network.

> If SAC (Voice) is less than SAC (Present Method of Operation) and the price of video is greater than SAC (video), then basic ratepayers are better off in the long run with the new network investment.[48]

In essence, Harris suggests that a price ceiling of the present method of operation is all that must be met.

This cannot be correct for purposes of long run pricing, however. Harris is comparing

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[46]Johnson, p. 4.

[47]Harris, p.7.

[48]Harris, p.7.

a sunk historical cost to a long run incremental cost. In a competitive market, the current cost could never be collected if it were above the cost of some available alternative, since competitors with the new technology would enter and put the incumbent out of business. The difference between the current method of operation and the Least Cost, Stand-Alone new system cost must be considered a monopoly rent (protected by some barrier to entry) and it must not be collected by the incumbent. This is one fundamental flaw in the companies' proposal.

Not surprisingly, Johnson, the cable company witness, pushes the example in the opposite direction. Instead of showing that consumers are getting a good deal on the integrated network (because new technology is less costly), he suggests that integration may be masking a bad deal (see Table 2).

TABLE 2:

HYPOTHETICAL COST STRUCTURES OF VIDEO/TELEPHONE NETWORKS WITH AND WITHOUT EXISTING NETWORK UPGRADES CONSIDERED

	JOHNSON (ignoring existing networks) into account)	JOHNSON taking existing networks
INTEGRATED SYSTEM	$1650	$1650
VIDEO ONLY	1400	1400
TELEPHONE ONLY	800	200
INCREMENTAL COST OF VIDEO	850	1450
INCREMENTAL COST OF TELEPHONE	250	250
COMMON COSTS	550	-50

What if adding new functionalities to a telephone-only network costs less than providing them through an integrated network?

> Table [2] displays the figures ... if we assumed that a $200 capital expenditure on the existing telephony network would give it the same capability as the telephony portion of the proposed integrated network. Consideration of the existing network shows stunningly different results from those previously.[49]

In this case, failure to take the existing network into account results in a cross-subsidy. The analysis which takes the existing network into account costs less than the analysis which includes telephone functionality in an integrated system.

> If the company were permitted to proceed on the basis of the figures [ignoring the existing network], and even if it proposed that video cover all the common cost ($550) in addition to incremental ($850), it would still fall short of covering the true video incremental cost of $1450 -- posing again the prospects of cross-subsidization.[50]

The ability to impose these costs stems from market power. Competitors cannot deploy networks that match the current price plus upgrade.

C. IMPLICATIONS OF LARGE COMMON COSTS AND POSSIBLE COST ALLOCATORS

The implications of these cost numbers go far beyond the question of monopoly rents and cross-subsidy. Even if we reject Harris' mistaken comparison between historic and future costs, allowing the allocation of all common costs to the monopoly utility sector raises a competitive problem.

In these examples, we note that the incremental cost floor for video is extremely low compared to its stand-alone cost. We must ask ourselves whether competition could possibly survive such a radical allocation of common costs. Video competitors would have to find

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[49] Johnson, p.8.

[50] Johnson, p.9.

someplace to park between 67.5 percent and 87.5 percent of their total costs. This is highly unlikely, to say the least.

At the same time, Johnson points out that there are major equity issues raised.

> The allocation of common costs, therefore, raises issues of fairness or equity between classes of users, not issues of subsidization of [one] service by another. Nevertheless, issues of fairness and equity are important since most would agree that all affected users of new technologies should share in whatever net benefits those technologies confer; that is, common costs should be allocated in some fair and reasonable way, reflecting national policy.[51]

The large common costs in these examples results in a wide range of subsidy-free prices. This underlies the debate over cost allocators. Each of the authors, and a number of other commenting parties have suggested a number of possible allocators.

Virtual Loops: Harris, for example, argues that if the regulators are uncomfortable with allowing the local exchange companies to allocate costs according to the market, they should use a virtual loop approach. This approach is a favorite of the local exchange companies. Since each service requires one channel or loop, they advocate splitting common costs 50-50 without any cost causal analysis.

> Two interim cost allocation rules can be used that would permit speedy approval of VDT service applications:
>
> 1. pre-Part 36, "regulated, not subject to separation," with common costs allocated by either the virtual loop or direct investment cost methods; or
>
> 2. under Part 36, using the virtual loop (or other reasonable) method of allocating common costs.[52]

Cost Causative Loops: Methodologies such as "the loop is a loop" approach appear

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[51]Johnson, p.4.

[52] Harris, p. 11.

reasonable since "a bit stream is a bit stream", but they are not actually based on cost causative analysis. The cost of a loop on a broadband network designed and engineered for video is greater than cost of a bit stream on a digital network designed for telephony.

Just because the basic architecture is the same does not mean that each of the two uses are equally causative of the same costs. Proper cost allocation principles require that the necessary functionalities and capacities be considered. In fact, designing the system to deliver video is much more expensive than designing it to deliver telephony.

- More fiber is needed between the central office and the pedestal.
- More electronics are needed on that fiber.
- More amplifiers are needed.
- Fewer lines can be served from a given pedestal.

For example, the Bell Atlantic and U.S. West VDT applications are based on 600 homes per remote distribution unit.[5] Other applications of a video network are as low as 200 homes per pedestal. In contrast, digital line carrier (DLC) for telephony can be designed at as much as 2,000 homes per pedestal, and certainly more than 1,000. Therefore, VDT requires between three and four times as many remote distribution units as DLC telephony. Johnson uses an

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[53]Bell Atlantic, In the Matter of the Application of: The Chesapeake and Potomac Telephone Companies of Maryland and Virginia for authority pursuant to section 214 of the Communications Act of 1934 as amended to construct, operate, own and maintain, facilities and equipment to provide a commercial video dialtone service within a geographic territory defined by the Maryland and Virginia portions of the Washington Local Access Transport Area (LATA), Exhibit 3A, and Bell Atlantic's Response to Inquiries, December 16, 1994, Exhibit 3, for common costs. U.S. West, In the Matter of the Application of U.S. West Communications, Inc., for Authority Under Section 214 of the Communications Act of 1934, as Amended to Construct, Operate, Own, and Maintain Facilities and Equipment to Provide Video Dialtone Service in Portions of the Colorado Springs Service Area, Exhibit 3A.

example in which 9 strands of fiber are pulled for a video service and one strand of fiber is pulled for telephone service (Johnson, p.14). Johnson's example would attribute 90 percent of the costs to video.

Therefore, "the loop is a loop" approach seriously underestimates the costs caused by video. The example of Remote Distribution Units (RDUs) suggests a difference of at least four to one. A conservative estimate is that it should be weighted at least four times more heavily than a telephone loop.

Minutes of Use: Traditional usage allocators of common costs, such as minutes of use, have been shunned by local exchange companies. The reason is obvious: Americans watch a great deal of television. The loop would be in use on average about 420 minutes per day for video use. In contrast, it would be in use on average about 40 minutes per day for telephone use (local and long distance) Thus, a minutes-of-use allocator would require a 7:1 ratio of video to telephony. This allocator would attribute 87.5 percent of common costs to video.

Actual Physical Use: Ironically, the local exchange companies find the most alarming allocator to be an actual usage allocator. Video usage is not only long in terms of time, it is wide in terms of bandwidth used (the information necessary to produce a picture is large compared to voice communications). If we count the number of bits flowing over the network, we find that the weighting would be on the order of 800:1. This allocator would attribute 99 percent of the costs to video.

Table 3 shows the results when the common costs from the earlier examples are allocated by these four different rules. CFA and CU believe that the Table makes it clear that, because the video service is the more demanding of the applications, any effort to understand the design

and use characteristics of the network will attribute much more of the common

TABLE 3
THE IMPACT OF ALLOCATORS FOR COMMON COSTS
ON COST RECOVERED FROM TELEPHONE SERVICE

METHOD	RATIO OF VIDEO TO TELEPHONY	HARRIS TELE CMN	HARRIS TELE TOT	HARRIS VIDEO	JOHNSON TELE CMN	JOHNSON TELE TOT	JOHNSON VIDEO
ALL TO TELEPHONE	0	600	900	100	550	800	850
LOOP IS A LOOP	1:1	300	600	400	275	525	1125
COST CAUSATIVE LOOP	4:1	120	420	580	110	360	1290
MINUTES OF USE	1:1	50	350	650	21	271	1379
BITS TRANSMITTED	800:1	6	306	584	3	253	1397

the common costs of the network to video. That is why the local exchange companies have insisted that the broadband network is simply the "next step in telephony."

D. POLICY IMPLICATIONS

The economic analysis of the video dialtone proposals and these examples of cost allocation, with their dramatic differences between results depending on which allocators are chosen, underscore our recommendation that cost causative analysis must be conducted and combined with stand-alone cost analysis by the Commission.

- Residential ratepayers should not be charged more than the least cost, total service long run incremental cost of core services.

- Regulators must ask not only about total service long run incremental cost; they must also ask about the least cost stand- alone approach, including upgrades to existing networks for the purposes of adding functionality.

The presence of significant common costs, and the interest of the companies in shifting

costs into the residential sector or denying the benefits of technological progress to the utility sector, creates a strong public interest need to protect potential competitors and ratepayers. Allocating costs to the competitive services prevents strategic pricing and minimizes the burden on ratepayers.

The importance of a cost analysis and recovery methodology that protects captive ratepayers is underscored by these examples. Subsidy free prices for telephone service would fall in a wide range in both of these examples -- anywhere from 250 to 900. The moment the FCC accepts the responsibility to allocate common costs in a reasonable fashion and enters into a cost causative analysis, as required by Section 254(k) of the 1996 Act, the maximum that can be charged to telephone service is cut by more than 50 percent.

IX.
THE FORWARD LOOKING COSTS OF AN EFFICIENT TELECOMMUNICATIONS NETWORK

The hypothetical discussion of VDT applications raises serious public policy questions about the fair and efficient allocation of economies of scale and scope. There is also the suggestion of a major disparity in the cost estimates. We have noted the very wide disparity between the embedded costs claimed by the companies and the forward looking TSLRIC costs calculated by others. In fact, this section demonstrates that the forward looking TSLRIC costs before the FCC are probably very good estimates of what an efficient telecommunications network should cost.

The section begins by comparing estimates of the cost put before the FCC in the LEC video dialtone applications to available evidence from other sources. It then contrasts the embedded cost claims to the litigated and estimated costs of providing telecommunications service.

A. THE ECONOMICS OF INTEGRATED HYBRID FIBER/COAXIAL (HFC) NETWORKS

1. What Are the Costs of Integrated Hybrid Fiber/Coax Networks?

Table 4 presents a series of estimates of costs for telephony only, video only and integrated systems. The variety of estimates can help to shed light on the wide range of cost estimates that have been placed before the FCC in related proceedings.

TABLE 4
COST ESTIMATES FOR DIGITAL LINE CARRIER AND HYBRID FIBER/COAX VIDEO

	C. O.	RDU/ FEEDER		DISTRIB-	DROP	CUSTOMER PREMISE	TOTAL DLCN
		UTION					
TELEPHONY							
Reed (A)	3	240	46	175	106	126	696
Hatfield (B)	45	251		309			743
Selwyn (C)	190	225	00	0	320		835
BROADCAST CABLE (A)							
Coax	12	19	26	182	82	103	424
Hybrid							
Bus	15	307	04	150	106	126	772
INTERACTIVE VIDEO							
Hybrid (A)							
SCM	329	299	34	170	82	103	1017
Bell (D)							
Atlantic	103	144	36	165	49	?	497
US West (E)	208	195		107	127	?	637

SOURCES AND NOTES: A) Reed, Residential Fibre Optic Networks: An Engineering and Economic Analysis (Artech House, Boston, 1992), Tables 5.3 and B.8. B) Hatfield, The Cost of Basic Universal Service, July, 1994. Table 4 presents bottom up engineering costs for a variety of density classes. The three middle density classes, which are ideal candidates for digital line carrier, all fall in the range of $726 to $764. C) Economics and Technology, Inc./ Hatfield Associates, Inc., The Enduring Bottleneck, 1994. Table 3.2 presents the cost of adding telephony to cable which relies on digital line carrier. D) Bell Atlantic, In the Matter of the Application of: The Chesapeake and Potomac Telephone Companies of Maryland and Virginia for authority pursuant to section 214 of the Communications Act of 1934, as amended to construct, operate, own and maintain, facilities and equipment to provide a commercial video dialtone service within a geographic territory defined by the Maryland and Virginia portions of the Washington Local Access Transport Area (LATA), Exhibit 3A, and Bell Atlantic's Response to Inquiries, December 16, 1994, Exhibit 3, for common costs. E) U.S. West, In the Matter of the Application of U.S. West Communications, Inc., for Authority Under Section 214 of the Communications Act of 1934, as Amended to Construct, Operate, Own, and Maintain Facilities and Equipment to Provide Video Dialtone Service in Portions of the Colorado Springs Service Area, Exhibit 3A. Feeder, Distribution and Drop are separately identified in the application. Video serving office equipment is treated as equivalent to Reed's central office equipment All other costs are treated as pedestal/interface.

As previously noted, digital line carrier for telephony and hybrid fiber/coax systems for video are similar architectures They involve pulling fiber through the network to a point where it connects to a remote distribution unit. Bit streams are intertwined until they arrive at this pedestal. Another transmission medium is then used for distribution plant: DLC uses copper; Fiber/Coax systems use coaxial cable. Bits are delivered to a network interface unit, which then feeds them to a piece of customer premise equipment. Because the basic architecture is the same, integrated delivery of telephony and video is an attractive prospect.

All of the costs are presented in terms of capital cost per home passed. For the purpose of this table, the HFC network is assumed to be ubiquitous -- i.e. all potential homes are passed. This is the assumption used by American companies, and it appears that Canadian companies are aiming for the same goal It is important to note, however, that "all homes passed" does not mean that the investment can be recovered from all subscribers. The starting point of "all homes passed" is used to create an equivalent basis for comparison purposes only.

The LEC cost estimates come in at about half the level of publicly available figures. Moreover, the most thorough figures from Reed actually assume half as many remote units and fifty percent more TV penetration. Therefore, the cost differences are even larger than they appear in the following Table U.S. West's figures are closer, but still lower by a substantial amount.

Cable industry experts argue that this is simply an underestimation of costs, particularly in electronics. LECs argue that this reflects dramatic decreases in cost experienced over the past few years, but these dramatic cost decreases are never realized for other services, like access.

LECs have been claiming for some time that the cost of fiber is falling rapidly. The cost

of digital switches has fallen by approximately 80 percent in the past few years.[54] Bell Atlantic's numbers would suggest that the cost of electronics are plummeting. Between one half and three quarters of the difference between the LEC estimate and the Hybrid-SCM estimates is accounted for in the central office and remote distribution unit categories. Cost causative analysis will be crucial here to ensure that telephone ratepayers do not pick up costs associated with either video dialtone or the integration of video and telephony.

Recent evidence suggests that digital line carrier (DLC) for telephony can lower costs by as much as 30 percent. For several decades, the local exchange companies have claimed that the cost of network access is stagnant, while efficiencies in switching and other network functions were dramatic. This difference in cost reduction was the basis for the argument that the cross-subsidy to local service was growing massively.

It is now clear that the cost of loop is undergoing a revolution and has been doing so for some years. Digital line carrier delivers loop at middle to long distances (over 9000 feet) at a dramatic cost saving compared to earlier technologies. Wireless will deliver similar cost savings in lower density, longer loop areas.

No recent statement captures this better than the testimony of an Illinois Bell witness (John Palmer). The Illinois Commerce Commission had issued its price cap order on a Monday (Docket No. 92-488) and cross examination in the Illinois Commerce Commission's competition docket began on Tuesday. The Bell witness was explaining why the costs used in the

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[54] "Direct Testimony of David Gabel on Behalf of the Office of Consumer Advocate," before the Commonwealth of Pennsylvania Public Utility Commission, The Bell Telephone Company of Pennsylvania Petition and Plan for Alternative Form of Regulation Under Chapter 30, December 1993, Exhibit 1.

competition proceeding looked different than the costs in the recently completed price cap proceeding. The company acknowledged that digital line carrier (DLC) was 30 percent cheaper than existing technologies for loops starting at 9000 feet.

> Q. Does the loop and LTF cost development here differ from that employed in Docket 92-0448?
>
> A. The methodology use is the same. Because of changes in the forward looking technology, DLC has been applied to larger segments of the loop population and unique loop costs have been developed...
>
> A. The factors that govern the economic choices have changed. The prices that Illinois Bell must pay for this technology, compared to copper alone, have declined since Docket 92-0448. Consequently, this technology will be employed in a greater range of cases in the future than they have been in the past.
>
> Q. What effect does the inclusion of DLC technology have on loop costs?
>
> A. The loop cost is reduced by 30%, compared to the use of copper facilities.[55]

The remainder of the difference appears to be the lack of customer premises costs.

Finally, we have what appear to be fairly well agreed upon costs for feeder and distribution.

2. What Does it Really Cost to Serve Broadband (Video) Customers?

The assumption that costs can be spread across all homes passed is crucial to the relatively low estimated cost in Table 1. The cost of these HFC networks appears low only if spread across all subscribers.

For example, Bell Atlantic's VDT system described in Table 4 only looks "cheap" if the network construction costs are spread over all homes passed. In fact, the page which shows

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"Video Dialtone Network Investments" identifies all potential end users. In the Washington D.C. area, for example, if the costs are spread over 1.25 million potential end-users, then the cost per home passed is only $500.

However, Bell Atlantic claims that in ten years it will capture only 40 percent of the video market. In order to capture this share of the market, Bell Atlantic will likely have to deploy its video dialtone network in a ubiquitous fashion. But, if Bell Atlantic can only recover these costs from the 40 percent of households who subscribe to video service, **the cost per home served is $1250** - much more consistent with Reed's figures.

Bell Atlantic claims it will use the video dialtone network to provide telephony, but the application placed before the Commission insisted that no costs had been allocated to telephony and none would be until telephony is actually cut over to the VDT network. Without a cost allocation mechanism in place, regulators must evaluate the economics of VDT applications based only on VDT subscribers.

The companies identify a large part of these costs as common. In the case of Bell Atlantic, common costs are 60 percent of total costs. In the case of U.S. West, it is 71 percent. All of the feeder, distribution and drop facilities are treated as common. A small part of the central office facilities are treated as common. Simply put, the loop is treated as a common cost of telephony and video. A figure of $400 for a loop is quite remarkable. Even if we were to add about $100 for the separate telephone drop that splits from the video, the cost is quite low.

B. COST ESTIMATES FOR TELEPHONE SERVICE

While the LECs have decried the Hatfield numbers on the cost of local service, these

numbers do appear to be reasonably consistent with the cost estimates used in the video dialtone applications. In fact, in cases litigated before state utility commissions, costs come out a lot closer to the Hatfield numbers than the embedded ARMIS numbers.

Table 5 shows a number of cost estimates for local service which put this video dialtone discussion in perspective. The Hatfield numbers used above are associated with a monthly cost of just over $21 for local residential service. This is 35 percent lower than the embedded cost numbers claimed by the LECs. The Hatfield cost model run at the state level produces similar results.

Recall as well that the Hatfield numbers were actually high compared to the LEC claims for their video dialtone costs. In fact, refinements to the Hatfield model incorporated into both the Benchmark Cost Model and a second version of the Hatfield numbers have lowered the cost estimates. The LECOM model is an engineering cost model that is somewhat different than the Hatfield model. It builds up costs from actual telephone company data on network configuration, rather than use a generalized architecture. LECOM is based on a sample of actual end offices. It too produces cost estimates far below the embedded cost claims of the LECs.

At least two public service Commissions have recently found that when costs are scrutinized and subject to cross examination, they are much lower than those claimed at the Federal level. Unfortunately few cost cases have gone to final Commission decisions in recent years. Instead, the debate over costs is stipulated away. For example, in Indiana, the company claimed a local cost of just over $30 per month, almost exactly what it reports to the ARMIS

TABLE 5:
ESTIMATES OF TSLRIC COMPARED TO EMBEDDED COSTS ($/MONTH)

AREA	THIRD PARTY SOURCE	AMNT	BCM MCI	BCM ARMIS	BCM EMBEDDED
NATIONAL	HATFIELD I	21.35	16.71	23.04	32.96
	HATFIELD II	17.25			
PA	HATFIELD I	18.34	14.67	20.24	30.16
UT	HATFIELD I	14.83	15.09	28.01	37.93
CO	HATFIELD I	15.83	18.71	25.80	35.72
CA	HATFIELD I	14.94	13.09	18.05	27.97
WA	COMMISSION	10.50	17.02	23.48	33.40
	HATFIELD I	11.15			
FL	COMMISSION	19.00	14.79	20.40	30.32
IN	LECOM	18.22	14.93	20.58	30.50
ME	LECOM	12.62	24.83	34.24	44.16

SOURCES:
NATIONAL: BCM - Benchmark Cost Model: A Joint Submission by MCI Communications Inc., NYNEX Corporation, Sprint Corporation, U S West, Inc., CC Docket No. 80-286, December 1, 1995.

Hatfield: I - Hatfield Associates Inc., The Cost of Basic Universal Service, July 1994, p. 4; II - Hatfield Associates Inc., The Cost of Basic Network Elements: Theory, Modeling and Policy Implications, March, 1996.

ARMIS EMBEDDED - "Comments U S West Inc.," In the Matter of Federal-State Joint Board on Universal Service, Before he Federal Communications Commission, FCC 96-93, CC Docket No. 96-45, April 12, 1996, Schedule 3. MCI, Sprint, USW and NYNEX Benchmark Cost Model, CC Docket No. 80-286, December 1, 1995.

STATES:

PA - "Hatfield Associates, Inc. on Behalf of MCI Telecommunications Corporation and AT&T Communications of Pennsylvania, A Model for Determining the Cost of Basic Universal Service in Pennsylvania," before the Pennsylvania Public Utility Commission, Advanced Notice of Proposed Rulemaking RE Formal Investigation To Examine and Establish Updated Universal Service Principles and Policies for Telecommunications Services in the Commonwealth, Docket No. L-009050102, July 17, 1995, Attachment 10.
UT - "Direct Testimony of Robert A. Mercer, AT&T Communications of the Mountain States," before the Public Service Commission of Utah, In the Matter of the Request for Agency Action of Phoenix Fiberlink of Utah Inc. for Authority to Provide Intrastate Telecommunications

Services in the State of Utah, In the Matter of the Application of Electric Lightwave Inc. for Authority to Compete as a Telecommunications Corporation and to Offer Public Telecommunications Services, In the Matter of an Investigation into Co-Location and Expanded Interconnection, U S West Communications (USWC) Advice Letter 95-16, Docket Nos. 95-2206-01, 94-22-2-01, 94-999-01, 95-049-T16, Attachment 3.

CO - "Direct Testimony of Robert A. Mercer, AT&T Communications of the Mountain States and MCI Telecommunications Corporation" before the Public Utility Commission of the State of Colorado, In the Matter of Proposed Rules Regarding Implementation of S. 40-15-101, ET SEQ -- Requirements Relating to Universal Service and the Colorado High Cost Fund, Docket No. 95R-558T, February 2, 1996, Attachment 3.

CA - "Testimony of Robert A Mercer on Behalf of AT&T Communications of California, Inc. (U 5002 C) and MCI Telecommunications Corporation (U 5011 C)," before the Public Service Commission of the State of California, Rulemaking on the Commission's Own Motion into Universal Service and to Comply with the Mandates of Assembly Bill 3643, Investigation on the Commission's Own Motion into Universal Service and to Comply with the Mandates of Assembly Bill 3643, Docket Nos. R.95-01-020 and 021, April 17, 1996, Attachment 4A.

WA - "Direct Testimony of Robert A. Mercer, AT&T Communications of the Pacific Northwest, Inc." Washington Utilities and Transportation Commission v. U S West, Inc., Docket No. UT-950200, August 11, 1995, Attachment 3A.

FL - "Order No. PSC-95-1592-FOF-TP," before the Florida Public Service Commission, In Re: Determination of funding for Universal Service and Carrier of Last Resort Responsibilities, Docket No. 950696 - TP, December 27, 1995, p. 32, states that "The record demonstrates that Southern Bell's average cost for a residential line is "somewhat less than $19 a month.'"

WA - "Fifteenth Supplemental Order: Commission Decision and Order Rejecting Tariff Revisions: Requiring Refiling," Washington Utilities and Transportation Commission v. U S West, Inc., April 10. 1996, p. 9 states, "USWC's own data show little cost difference between its rural and urban service territories. The Commission directs the Company to eliminate extended area service surcharges and establish a statewide residential rate of $10.50 per month, the average i effect today. The $10.50 rate covers the cost of local residential service and provides a substantial contribution to shared and common costs.

LECOM: IN - David Gable, Current Issues in the Pricing of Voice Telephone Services (American Association of Retired Persons, 1995), p. 17, and "Testimony of David Gable, Indiana Utility Regulatory Commission, In the Matter of a Petition of Indiana Bell Telephone and Telegraph Company, Incorporated, for the Commission to Decline to Exercise in Part Its Jurisdiction over Petitioner's Provision of Basic Local Exchange Service, to Utilize Alternative Regulatory Procedures for Petitioner's Provision of Basic Local Exchange Service and Carrier Access Service, and to Decline to Exercise in Whole Its Jurisdiction Over All Other Telecommunications Services and Equipment Pursuant to IC 8-1-2-6, Cause No. 39075; ME - "Testimony of David Gable," State of Maine Public Utilities Commission, Re: Investigation Into New England Telephone Company's Cost of Service and Rate Design, Docket No. 92-130, Exhibit 7.

file. Both the LECOM model and a top down analysis of costs conducted by the People's Council showed costs in the range of $17-18. The company settled for a rate reduction.[56] In many other cases, however the companies report proprietary cost data to the public service Commissions. This data, which is never made public, consistently shows that the costs reported to ARMIS are vastly overstated.

C. POLICY IMPLICATIONS

This analysis of two types of data suggests that the claims being made by LECs that vast sums of economic resources must be included in the cost of unbundled network elements to compensate them for their embedded costs should be rejected. LEC claims of embedded costs have gotten grossly out of line with the deployment of efficient networks to provide telephone service. The fact that several state commissions have found much lower costs, when estimates are subject to careful scrutiny suggests that part of the difference is caused by the misreporting and misallocation of cost data in unaudited accounts. As noted in the previous Section, we also believe that part of the difference is due to excess profits, inefficiency and strategic investments, for which the incumbent companies have no legitimate basis to claim compensation from ratepayers.

After these costs are excluded, there may be a small sum of investment that could be

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[56]"Testimony of Harold L. Rees," Indiana Utility Regulatory Commission, In the Matter of a Petition of Indiana Bell Telephone and Telegraph Company, Incorporated, for the Commission to Decline to Exercise in Part Its Jurisdiction over Petitioner's Provision of Basic Local Exchange Service, to Utilize Alternative Regulatory Procedures for Petitioner's Provision of Basic Local Exchange Service and Carrier Access Service, and to Decline to Exercise in Whole Its Jurisdiction Over All Other Telecommunications Services and Equipment Pursuant to IC 8-1-2-6, Cause No. 39075.

"stranded" when regulators impose an efficient pricing policy on interconnection and resale of network to promote competition. In order to treat consumers fairly, any such costs which remain should be subject to the analysis indicated in Section VII to ascertain whether and how they should be recovered.